RESEARCH PROBLEM STATEMENT

Problem Title: Bridge Scour Countermeasure Phase II **No.:** 05.04-2

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1. Briefly describe the problem to be addressed:

Sister and Regulatory agencies have placed an increased emphasis on the "soft armoring" and modified rock vanes & barbs to provide natural stream stability enhancement measures instead of traditional engineering responses to stabilize river and stream beds against scour. These measures include the construction of shallow flow control structures, referred to as Rosgen countermeasures, across all or part of the river. Structure types include cross vanes and j-hooks. Claims have been made that these structures are durable, cost effective, and provide scour stability, but the necessary case studies have not been documented to verify these claims.

2. List the research objective(s) to be accomplished:

1. In depth examination and monitoring of a recently constructed installation

2. Determining the applicability of numerical modeling approaches to evaluate these types of structures

3. Define conditions for which these non-traditional engineering approaches can be applied

3. List the major tasks required to accomplish the research objective(s): Estimated person-hours

1. Continue to monitor the performance of the selected in-stream structures

2. Survey and model additional structures at different locations

3. Model flow though the structures

4. Compile empirical equations for designing structures for defined flow rates

5. Prepare a manual for designing the type of structures near highway facilities

4. Outline the proposed schedule (when do you need this done, and how we will get there):

The project should be completed in two years. Complete the monitoring of the existing structures in one year, complete the modeling in the following 6 months and prepare the manual for the remainder of time

5. Indicate type of research and / or development project this is:

Large: ☒ Research Project ☐ Development Project

Small: ☐ Research Evaluation ☐ Experimental Feature ☐ New Product Evaluation ☐ Tech Transfer Initiative : ☐ Other_____

6. What type of entity is best suited to perform this project (University, Consultant, UDOT Staff, Other Agency, Other)?

University

7. What deliverable(s) would you like to receive at the end of the project? (e.g. useable technical product, design method, technique, training, workshops, report, manual of practice, policy, procedure, specification, standard, software, hardware, equipment, training tool, etc.)

Manual for designing the shallow flow structures in water courses near highway facilities.

8. Describe how will this project be implemented at UDOT.

The results of the research will aid the designers to improve water course crossing, mitigating the impact of long term erosion and scour on highway elements.

9. Describe how UDOT will benefit from the implementation of this project, and who the beneficiaries will be.

UDOT and the public in general will benefit from the installation of more natural structure in the river environments next to highway structures. These structures when properly designed can provide long lasting protection for highway facilities and better habitat for aquatic fauna.

10. Describe the expected risks, obstacles, and strategies to overcome these.

Lack of flow in the rivers where we are studying the installations. Two-dimensional modeling or scale modeling may help overcome this problem.

11. List the key UDOT Champion of this project (person who will help Research steer and lead this project, and will participate in implementation of the results): Michael Fazio, Denis Stuhff, Tim Ularich

12. Estimate the cost of this research study including implementation effort (use person-hours from No. 3): $42,000 (plus some BYU contributions)

13. List other champions (UDOT and non-UDOT) who are interested in and willing to participate in the Technical Advisory Committee for this study:

Name	Organization/Division/Region	Phone	Attended UTRAC?
A) Dr. Zundel	Brigham Young University	801-422-4080	√
B) Dr. Miller	Brigham Young University		√
C) Brent Jensen	UDOT		√
D) Terry Johnson	UDOT		√
E) Lars Anderson	UDOT		√
F) Kevin VanFrank	UDOT		
G)			

14. Identify other Utah agencies, regional or national agencies, or other groups that may have an interest in supporting this study:

US Forest service, FHWA, other DOT's across the country, Consultants, US Corp of Engineers, Regulatory Agencies